Waterworks System Assessment Standards

A waterworks System Assessment (WSA) is an inspection and reporting process intended to aid waterworks owners to:

- identify, analyze and mitigate any potential adverse health risk and environmental impacts associated with waterworks infrastructure, equipment and related maintenance and operational procedures or practices;
- determine and evaluate the current performance, level of optimization, functionality, capability, efficacy and sustainability of the waterworks;
- understand options and costs so as to implement improvements needed to meet the province's regulatory water quality standards;
- identify opportunities to reduce costs and risks and to increase the efficiencies and capability of waterworks operation; and
- in the context of successive reviews, determine the progress made in accordance with past assessments and recommendations for change or improvement to waterworks infrastructure and maintenance.

These standards were developed to ensure a detailed inspection and evaluation of waterworks infrastructure and maintenance schedules and activities takes place on a regular basis. This will enhance functionality and avoid unnecessary health risks associated with waterworks. These standards are similar to those in other jurisdictions in Canada that have recently renewed their drinking water legislation.

Scope of Waterworks System Assessments:
The WSA planning phase involves a detailed review of the available information on the water supply, treatment, storage and distribution systems. The review includes raw and treated water quality, treatment system plans, manuals, historic problems and maintenance records. Saskatchewan Environment (SE) may be consulted to obtain raw and treated water quality data, and to determine compliance with monitoring requirements. The historical information review is limited to the previous five years, or since the latest major facility upgrade. Historical review beyond five years is allowed only with significant reason. For regional systems where a supply, treatment and transmission facility may supply several separate storage and distribution facilities, a WSA is required by each permittee for their works. The WSA shall clearly identify waterworks problems and emphasize solutions.

The WSA is to examine everything related to infrastructure and maintenance protocols, from the collection of the raw water to the point where the water reaches the consumer tap. The WSA is intended to be a comprehensive review. As each waterworks system is unique, the studied WSA characteristics shown in this standard will need to be modified. Further information can be obtained by reviewing SE's document A Guide to Waterworks Design and through discussion with SE staff, when site specific questions arise.

The WSA shall also examine any new components that may have been added as a result of system expansion or as a result of previous assessment recommendations. WSAs are to include existing plans or reference to plans of the waterworks system. Where plans are incomplete or missing, schematic process flow plans or isometric sketches are to be made. WSAs are to include an evaluation of Operating Manuals for the waterworks and a review of previous project

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reports and previous WSA. Obvious problems associated with the waterworks that presently or may jeopardize the finished water quality to the point that it no longer meets the regulatory requirements are to be highlighted in the WSA. The WSA will not assess regulatory compliance in relation to quality assurance and quality control (QA/QC) policy, record keeping, training and monitoring requirements found within *The Water Regulations* since this is performed by SE. Water quality testing shall be based on risk reduction and the amount of testing is to be minimized. The waterworks' size and complexity will dictate to a degree the complexity and demands of a WSA. The WSA is to contain recommended improvements and conceptual cost estimates.

Persons conducting WSAs must inspect and ensure all system components are assessed that impact risk management. The WSA includes an on-site inspection and assessment of the following existing system components and maintenance activities:

Raw Water Supply: Supply sources are to be assessed separately - surface water, groundwater, groundwater under the direct influence of surface water, piped supply from others. Raw supply characteristics to be evaluated include but are not limited to:

- intake condition including siting and physical condition;
- sizing and condition of raw water pumps and chemical feed pumps;
- sizing and condition of the storage reservoir;
- the condition and functionality of the intake pump house (both building and equipment);
- local well-head condition, vulnerability, protection and remaining service life;
- reliability; and
- maintenance protocols employed for all aspects of the management of the raw water supply.

In assessing these components, all potential hazards and their causes shall be identified and the level of risk associated with each of the hazards estimated, so priorities for risk management action can be established.

Assessment of the protection of wells shall examine existing information regarding the zone of influence and recharge areas for ground water supplies and the effect or susceptibility of these recharge areas to contamination from wastes, effluents and spills. In the case of surface water supplies, the assessment shall assess existing information regarding the proximity of effluent discharges, storm water discharges, riparian area management practices or other possible contamination sources on shorelines, the susceptibility of source water to contamination and the simple existence of any watershed controls. Assessment of the protection of wells and assessment of surface watershed is limited to existing currently available information. The WSA does not require widespread hydrogeological study or surface watershed study. The WSA may recommend that a more widespread hydrogeological study or surface watershed study needs to be undertaken, for example in the case of groundwater-under-direct-influence of surface water being suspect but not proven. Reasons for the need for further study must be stated in the WSA.

Water treatment and disinfection system: 103-07083/

Characteristics to be evaluated include but are not limited to:

- treatment processes;
- treatment components;
- equipment condition and sizing;
- treatment competence;
- design capacity, piping and appurtenances;
- controls and instrumentation;
- in-plant turbidity levels (where employed as a diagnostic aid);
- chemicals applied and dosage of chemicals in last year;
- chemical feeders;
- feed rate capacity;
- chemical storage;
- wastewater disposal;
- operation and maintenance procedures;
- type of disinfection process;
- disinfectants used;
- estimated disinfectant contact time;
- disinfection effectiveness;
- ability to meet appropriate CT values;
- housekeeping and cleanliness;
- metering;
- reliability; and
- backflow prevention.

The assessment shall ensure that the treatment process and operations being employed address all potential hazards and the level of risk associated with those hazards. The assessment shall examine the plant capability and required changes to produce water which meets the new turbidity and chemical health standards found within Sections 33 and 34 of *The Water Regulations* and all other pertinent water quality regulations.

Storage and distribution system:

Characteristics to be evaluated include but are not limited to:

- condition and integrity of the storage reservoir(s);
- capacity, design, sizing;
- protective surface coatings, drainage, cover drainage, materials, entrances and vents;
- distribution system pumping facilities and capacities;
- security against unauthorized access;
- backflow prevention at pumping facilities and high hazard locations including truck fills; and
- maintenance practices.

Information on disinfectant residuals maintained in the distribution system can be obtained from SE. The assessment shall ensure that the storage and distribution process and operations being employed address all potential hazards and the level of risk associated with those hazards.

In terms of pipeline and distribution systems, the assessment shall examine the pipe construction materials and estimated remaining working life, pipeline supply capacity in relation to demand on the system, maintenance procedures, breaks and reliability, cleanout capability and presence of backflow prevention at service connections.

Immediate Reporting of Operating Anomalies

Direct sources or instances of microbial contamination or malfunctioning chlorine equipment must be reported immediately to the owner of the waterworks (permittee) and to SE's local Environmental Project Officer (EPO) or EcoRegion.

Preparation and Submission of a Report

WSAs are to be completed by a professional engineer or under the supervision of a professional engineer by means of an inspection and evaluation of the above noted aspects of waterworks infrastructure and maintenance protocols. Where an engineer is in direct responsible charge of the day-to-day operations of the waterworks, an assessment which has been conducted in conjunction with an independent engineer or engineering firm (audited assessment) is acceptable. Engineer reports prepared for new works may form part of the WSA. The WSA will be a valuable resource for waterworks owners in support of further decision making regarding upgrading and operation.

- The Engineer in charge of preparing this assessment report shall prepare a written report to the owner of the water treatment facility outlining findings and recommendations.
- Four copies of the report shall be submitted to the owner. The Engineer shall meet with the owner to discuss the WSA.
- The report shall contain a signed declaration made by the Engineer responsible for the report as follows: "I, the undersigned, hereby declare that to the best of my knowledge, the information contained herein and the information in support of this submission as completed by me is complete and accurate in accordance with my obligations under *The Engineering and Geoscience Professions Act (2000)* and its regulations. I further declare that this submission has been prepared in accordance with the published standard for this submission."
- If the waterworks owners disagree with the facts or findings of the WSA then the owners may attach a written statement of disagreement to the WSA. The statement shall contain the reasons for each disagreement.

Supporting Legislation and Rationale:

Requirements for completion of an engineering waterworks assessment are derived from subsections 35 of *The Water Regulations (2002).*

35 (1) Subject to subsections (2) to (5), the permittee of a waterworks supplying water intended or used for human consumptive use shall ensure that an independent engineering assessment of the following respecting the waterworks is conducted at least once every five years:

(a) the waterwork's performance; (b) the waterwork's condition;
(c) the waterwork's capacity; (d) the waterwork's functionality;
(e) the waterwork's processes; (f) the waterwork's optimization;
(g) the waterwork's sustainability; and (h) the waterwork's maintenance.

(2) An assessment conducted pursuant to this section must be conducted in accordance with the standards developed by the minister.

(3) The first assessment required pursuant to subsection (1) must be completed by December 31, 2005.

(4) An assessment is to be done at the sole expense of the permittee of the waterworks.

(5) The permittee of a waterworks supplying water intended or used for human consumptive use shall report the findings of an independent assessment required by this section to the minister within 90 days after the completion of the assessment.

WSA will help the waterworks in improving the overall performance of the system and possible compliance of the regulatory requirements. Other benefits include:

- stronger operational control;
- employee awareness;
- commitment to protect customer's health while minimizing any effect on the environment; and
- improved relations with the stakeholders and public.